Health Literacy, Health Outcomes and Equity: A Trend Analysis Based on a Population Survey

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Abstract

Health literacy continues to be an issue among minority groups. Population surveys are one strategy used to help better understand health disparities. The Behavioral Risk Factor Surveillance System (BRFSS) in Kansas added health literacy questions to the survey in 2012. This study examined population health literacy levels and health trends from 2012 to 2018. The health status variables included health care coverage status, general health rating, presence of chronic conditions, and length of time since the last check-up. The percentage of individuals reporting low health literacy decreased from 67% in 2012 to 51% in 2018. The percentage of participants with income levels less than $15 000 was 9% in 2012 and 7% in 2018. Health literacy was lowest among the age group 18 to 24-year-olds, those who identified as multiracial, separated, not graduated from high school, out of work for more than 1 year, income less than $10 000, with other living arrangements, and living in a suburban county of metropolitan statistical area. Additionally, many health conditions improved, and those reporting health insurance increased slightly. The study demonstrates how health literacy continues to be an issue, and how education and primary prevention are necessary to improve limited health literacy and health outcomes. Findings from both state-level and national BRFSS population surveys can help educate the public health and clinical health services workforce to provide better care and address health disparities for highrisk populations.

Introduction

Health literacy has become a critical topic as it is strongly associated with the ability of individuals to engage in complex disease management and self-care.[1] Health literacy can be described as a result of complex interactions among healthcare, education, social and economic status, and culturally lived experiences. The formal definition of health literacy as described by the Institute of Medicine is, "the degree to which individuals can obtain, process, and understand the basic health information and services they need to make appropriate health decisions."[2] Limited health literacy has been associated with and well regarded as a contributor to the presence of multiple comorbid and chronic conditions, overall resulting in poor health outcomes.[1-3] As of 2018, there were approximately 80 million individuals in the United States with an estimated low or limited health literacy.[1] Some of the struggles people with low

health literacy may encounter include understanding medical terminology, difficulty filling out forms, and limited access to a provider in their community.[4]

Several studies have demonstrated that age, race/ethnicity, education level, economic status, cognition, health status, and non-native English speakers are factors associated with low health literacy.[1,5,6] These health literacy factors have also been shown to be associated with and drivers of health disparities. Previous reports suggest individuals that face health disparity challenges will more likely have low levels

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of health literacy.[7] There are several assessment tools that are valid, reliable, and well-established for assessing health literacy, however, recent studies have demonstrated the possible feasibility of the Kansas (KS) Behavioral Risk Factor Surveillance System (KS BRFSS) as a tool to measure health literacy at the population level.[8,9] A previous study demonstrated individuals with low levels of health literacy were 7 times as likely to be unsure of at least 1 health condition than those with high health literacy using the BRFSS survey tool as a measure of population health.[9]

An examination of health literacy over the years becomes crucial as socioeconomic and health disparities have increased over the past years.[10,11] The focus on trends of health literacy can help explain the current gaps in health outcomes, allowing us to address emerging challenges and create opportunities to address health disparities and improve health outcomes.[11] The objective of this continuation study was to examine health literacy among other health and demographic variable trends from 2012 to 2018 from previously reported data measured by BRFSS. This Kansas-specific study provides a further investigation into the prevalence of health literacy and its related factors over a 6-year period of time.

Methods

Study Population

The data analyzed included the responses of Kansas residents that participated in the 2012, 2014, 2016, and 2018 Kansas BRFSS (KS BRFSS). All respondents completed the health literacy assessment portion of the survey. The culmination of data from each of these years for demographic variables, health care coverage status, and general health rating was reported. Data for each year for all the demographic and health status variables were summarized and reported. This study was reviewed and approved by a university Institutional Review Board.

Measures

All measures were collected via the KS BRFSS survey.[6,9] The survey is a statewide survey conducted by the state health department and supported by the Centers for Disease Control and Prevention (CDC). It is a randomized digit dialing telephone survey (including both landlines and cell phones) to collect self-reported information including health risk behaviors, clinical preventive health practices, and health care access that are associated with the leading causes of morbidity and mortality in the United States. The CDC supports state data collection through the process of editing survey questions, weighting questions, and analyses for use at the state level. All states participating in the BRFSS survey ask a core set of questions selected by the CDC, plus optional questions and state-added questions. The core set of BRFSS survey questions cover the topics of health status, health care access, healthy days, life satisfaction, emotional satisfaction, disability, tobacco use, alcohol use, exercise, immunizations, HIV/AIDS, diabetes, asthma, and cardiovascular disease. Optional questions can vary from state to state, however, the CDC does not support analyses.[12]

The demographic variables from the KS BRFSS survey included income, employment, marital status, metropolitan statistical area, age, education, race/ethnicity, respondents' sex, veteran status, and housing status. The health status variables of interest included health care coverage status, general health rating, presence of chronic conditions, and length of time since the last check-up.[9]

Health outcomes were measured using the same methodology as previously reported.[9] Health literacy was measure by scoring the responses to the following questions: "(1) How difficult is it for you to get advice or information about health or medical topics if you needed it? (2) How difficult is it for you to understand information that doctors, nurses and other health professionals tell you? and (3) You can find written information about health on the Internet, in newspapers and magazines, and in brochures in the doctor's office and clinic. In general, how difficult is it for you to understand written health information?" The questions were scored as: "Very easy" (4 points), "Somewhat easy" (3 points), "Somewhat difficult" (2 points), "Very difficult" (1 point) and 0 points for other responses (eg, don't know or refused). The cumulative scores for each respondent who answered all 3 health literacy questions were calculated. The categorization of health literacy was categorized similarly as previously reported based on recommendations by the Centers for Disease Control and Prevention (CDC), which included 2 categories, high health literacy and less than high health literacy using a median split.[9,13]

Statistical Analysis

All analyzed data utilized IBM SPSS Statistics version 24 and the weighting methodology suggested by the CDC.[9] Simple bivariate trend analysis was performed for the demographic and health variables in relation to the years the surveys were administered. This analysis was performed to demonstrate a trend of these variables, including health literacy over the years. Nominal-by-nominal, nominal-by-interval, or interval-by-interval tests were performed, as appropriate, to evaluate the significance of these bivariate associations between all variables and for each year the survey was conducted. Additionally, logistic regression was performed to determine the significance of any noted trend in health literacy while controlling for demographic and health status variables.

Results

Weighted demographic and health characteristics data, including health literacy, were compiled from the 2012, 2014, 2016, and 2018 KS BRFSS (n = 2 916 380) and summarized (Table 1). More than half (63.3%) of participants had a less than high health literacy. Older individuals, those 65 years and older (31.2%), retired (27.6%), high income of more than $50 000 (51.4%), outside of Metropolitan Statistical Area (MSA) county (48.1%), white (87.1%), have health coverage (91.3%), and was in good or better health (83.1%) made up the demographic and health status profile across 2012 to 2018. An interesting find in that only 36.7% of the sample population had a high health literacy. Across each year, more individuals participated in 2012 (36.3%) and 2014 (32.2%). Less than 7% of individuals had a very low-income level of less than $15 000 and were unemployed (3.7%). Majority of the participants had graduated from high school compared to only 8.3% that did not.

The data was further analyzed each year the survey was administered (2012, 2014, 2016, and 2018) in association with the weighted demographic and health status characteristics (Table 2). Across each of these years, more than 50% of participants had a less than high health literacy, with the highest prevalence in 2012 at 67.1%. The majority of respondents were female across all years (57.0%). Individuals ages 65 and older were the consistent majority with about 37.4% in 2018. The lowest participation rate by age was among those 18 to 24 years of age (5.8%). Across all years, the majority were White (87.1%), married (56.6%), graduated college or technical school (37.3%), employed for a wage (44.5%), greater than $75 000 income level (30.4%), owned a home (75.5%), not a veteran (86.7%), and had health coverage (90.6%). There was a distribution of participants in which 35.0% lived in the City Center of MSA and 34.3% were not in an MSA. About 74.9% of participants had a routine checkup within the past year, and 83.1% in good or better health.

Each of the demographic and health variable characteristics were evaluated by year to determine associations. This association allows for the trend analysis for each variable across all 4 of the years, determined by Kendall's tau-c, gamma, and *P*-value. Health literacy across all 4 years demonstrated a strong significant association with demographic characteristics ($\tau_c = 0.156$, $P < .005$) suggesting that the uncertainty in knowing the health literacy distribution is reduced by 21.6% with this model (Table 3). Respondents' sex and age were statistically significant ($P < .005$). Race/ethnicity, veteran status, and a majority of the health variable characteristics except for length of time since last routine checkup, "ever told have asthma," "ever told have depressive disorder," "ever told have kidney disease," and "ever told have diabetes," were not statistically significant. Marital status, education, income level, housing status, and MSA demonstrated strong statistically significant associations

Table 1. Weighted Demographic and Health Status Characteristics of Kansas (KS) BRFSS 2012, 2014, 2016, and 2018 Sample (N = 2 916 380).

Characteristic	N	%
Total	2 916 380	
Health literacy		
Less than high health literacy	1 846 915	63.3
High health literacy	1 069 466	36.7
Year		
2012	1 059 086	36.3
2014	939 630	32.2
2016	467 810	16
2018	449 853	15.4
Income		
<$15 000	188 607	6.5
$15 000-<$25 000	406 629	13.9
$25 000-<$35 000	334 660	11.5
$35 000-<$50 000	487 377	16.7
$50 000+	1 499 106	51.4
Employment		
Employed full time	1 575 763	54
Not employed	108 533	3.7
Homemaker	181 343	6.2
Student	72 976	2.5
Retired	806 131	27.6
Unable to work	171 632	5.9
Marital status		
Not partnered	914 581	31.4
Partnered	2 001 799	68.6
Metropolitan Statistical Area (MSA)		
In MSA City Center	908 043	31.1
Within MSA county but not City Center	605 377	20.8
Outside MSA county	1 402 960	48.1
Age (years)		
18-24	118 655	4.1
25-34	217 578	7.5
35-44	411 994	14.1
45-54	580 581	19.9
55-64	677 877	23.2
65 or older	909 692	31.2
Education		
Did not graduate high school	241 096	8.3
High school graduate	750 396	25.7
Some college or technical school	955 553	32.8
Graduated college or technical school	969 334	33.2
Race/ethnicity		
N-H White	2 539 225	87.1
N-H Black	131 534	4.5
N-H Other	65 480	2.2
N-H Multiracial	40 819	1.4
Hispanic	139 320	4.8
Have healthcare coverage		
Yes	2 663 133	91.3
No	253 246	8.7
Adults with good or better health		
Good or better health	2 422 626	83.1
Fair or poor health	493 754	16.9

Abbreviation: N-H, Non-Hispanic.

Table 2. Weighted Demographic and Health Status Characteristics of Kansas (KS) BRFSS Sample in Relation Each Year the Survey was Given (N = 2 916 380).

	2012		2014		2016		2018		Total	
Variable	N	%	N	%	N	%	N	%	N	%
Health literacy										
Less than high health literacy	2952	67.10	4000	66.10	2426	51.20	2107	51.00	11 485	59.40
High health literacy	1450	32.90	2052	33.90	2315	48.80	2025	49.00	7842	40.60
Sex										
Male	4657	39.50	5863	42.70	5371	44.10	4979	46.10	20 870	43.00
Female	7144	60.50	7880	57.30	6813	55.90	5831	53.90	27 668	57.00
Age (years)										
18-24	585	5.00	875	6.40	705	5.80	662	6.10	2827	5.80
25-34	1146	9.70	1456	10.60	1295	10.60	1089	10.10	4986	10.30
35-44	1423	12.10	1623	11.80	1355	11.10	1202	11.10	5603	11.50
45-54	2048	17.40	2264	16.50	1887	15.50	1625	15.00	7824	16.10
55-64	2639	22.40	3101	22.60	2655	21.80	2201	20.30	10 596	21.80
65 or older	3960	33.60	4424	32.20	4291	35.20	4043	37.40	16 718	34.40
Race/ethnicity										
N-H White	10 349	88.10	11 713	86.20	10 509	87.30	9273	86.90	41 844	87.10
N-H Black	544	4.60	528	3.90	470	3.90	444	4.20	1986	4.10
N-H Other	269	2.30	337	2.50	265	2.20	266	2.50	1137	2.40
N-H Multiracial	150	1.30	237	1.70	182	1.50	161	1.50	730	1.50
Hispanic	441	3.80	774	5.70	609	5.10	525	4.90	2349	4.90
Marital status										
Married	6773	57.60	7794	57.10	6791	56.20	5980	55.60	27 338	56.60
Divorced	1581	13.40	1789	13.10	1607	13.30	1434	13.30	6411	13.30
Widowed	1579	13.40	1671	12.20	1557	12.90	1377	12.80	6184	12.80
Separated	150	1.30	185	1.40	157	1.30	149	1.40	641	1.30
Never married	1432	12.20	1874	13.70	1657	13.70	1538	14.30	6501	13.50
A member of an unmarried couple	250	2.10	340	2.50	322	2.70	281	2.60	1193	2.50
Education										
Did not graduate high school	726	6.20	836	6.10	622	5.10	545	5.10	2729	5.60
High school graduate	3221	27.30	3858	28.20	3398	28.00	2850	26.40	13 327	27.60
Some college or technical school	3447	29.30	3999	29.30	3587	29.60	3240	30.00	14 273	29.50
Graduated college or technical school	4387	37.20	4974	36.40	4519	37.30	4155	38.50	18 035	37.30
Employment										
Employed for wage	5161	43.80	6141	45.10	5343	44.70	4762	44.40	21 407	44.50
Self-employed	932	7.90	1170	8.60	1070	9.00	977	9.10	4149	8.60
OOW more than 1 year	256	2.20	225	1.70	179	1.50	135	1.30	795	1.70
OOW less than 1 year	242	2.10	282	2.10	206	1.70	171	1.60	901	1.90
Homemaker	657	5.60	826	6.10	666	5.60	454	4.20	2603	5.40
Student	284	2.40	389	2.90	283	2.40	283	2.60	1239	2.60
Retired	3551	30.10	3722	27.30	3462	29.00	3276	30.60	14 011	29.10
Unable to work	701	5.90	871	6.40	746	6.20	657	6.10	2975	6.20
Income level (in $)										
<10 000	403	3.90	450	3.90	331	3.30	289	3.20	1473	3.60
<15 000	522	5.10	550	4.80	406	4.10	375	4.10	1853	4.50
<20 000	800	7.70	783	6.80	630	6.30	526	5.80	2739	6.70
<25 000	1025	9.90	1106	9.60	926	9.30	769	8.50	3826	9.40
<35 000	1270	12.30	1386	12.00	1183	11.90	1006	11.10	4845	11.80
<50 000	1684	16.30	1884	16.30	1605	16.10	1403	15.50	6576	16.10
<75 000	1762	17.00	2027	17.60	1764	17.70	1617	17.80	7170	17.50
≥75 000	2870	27.80	3349	29.00	3119	31.30	3079	34.00	12 417	30.40

(continued)

Table 2. (continued)

Variable	2012 N	2012 %	2014 N	2014 %	2016 N	2016 %	2018 N	2018 %	Total N	Total %
Housing status										
Own	9083	77.30	10094	75.20	9047	75.00	8013	74.40	36237	75.50
Rent	2122	18.10	2802	20.90	2507	20.80	2310	21.40	9741	20.30
Other arrangement	545	4.60	519	3.90	510	4.20	450	4.20	2024	4.20
Metropolitan Statistical Area (MSA)										
City Center (CC)	3420	36.80	2402	32.40	2213	38.70	1197	30.40	9232	35.00
Outside of CC but inside County of CC	1581	17.00	1617	21.80	769	13.50	895	22.80	4862	18.50
Inside Suburban county of MSA	1158	12.50	914	12.30	689	12.10	447	11.40	3208	12.20
Not in an MSA	3129	33.70	2476	33.40	2046	35.80	1395	35.50	9046	34.30
Have health care coverage										
Yes	10540	89.50	12331	90.30	11085	91.50	9836	91.30	43792	90.60
No	1235	10.50	1332	9.70	1026	8.50	941	8.70	4534	9.40
Veteran status										
Yes	1481	12.60	1789	13.00	1689	14.00	1471	13.60	6430	13.30
No	10317	87.40	11924	87.00	10379	86.00	9310	86.40	41930	86.70
Adults with good or better health										
Good or better health	9758	82.90	11468	83.70	10114	83.20	8910	82.40	40250	83.10
Fair or poor health	2017	17.10	2237	16.30	2037	16.80	1897	17.60	8188	16.90
Length of time since last routine checkup										
Within past year	8618	74.20	9782	73.00	8635	73.00	8540	80.00	35575	74.90
Within past 2 years	1353	11.70	1585	11.80	1402	11.90	972	9.10	5312	11.20
Within past 5 years	701	6.00	935	7.00	824	7.00	569	5.30	3029	6.40
5 or more years	863	7.40	923	6.90	802	6.80	546	5.10	3134	6.60
Never	77	0.70	170	1.30	167	1.40	44	0.40	458	1.00

Abbreviations: N-H, Non-Hispanic; OOW, out of work.

Table 3. Simple Bivariate Trend Analysis of Demographic and Health Variables Characteristics of Kansas (KS) BRFSS Sample.

Variable	N	Symmetric measures ordinal by ordinal τ_c [SE]	G [SE]	P
Health literacy	19327	0.156 [0.008]	0.216 [0.011]	.000
Sex	48538	−0.051 [0.005]	−0.070 [0.007]	.000
Age (years)	48554	0.015[0.004]	0.020 [0.005]	.000
Race/ethnicity	48046	0.004 [0.002]	0.018 [0.010]	.065
Marital status	48268	0.015 [0.004]	0.024 [0.006]	.000
Education	48364	0.014 [0.004]	0.020 [0.005]	.000
Employment	48080	0.000 [0.004]	0.000 [0.005]	.000
Income level	40899	0.049 [0.004]	0.060 [0.005]	.000
Housing status	48002	0.015 [0.003]	0.035 [0.008]	.000
Metropolitan Statistical Area (MSA)	26348	0.016 [0.005]	0.023 [0.007]	.001
Have health care coverage	48326	−0.016 [0.003]	−0.064 [0.012]	.000
Veteran status	48360	−0.011 [0.003]	−0.031 [0.010]	.02
Adults with good or better health	48438	0.004 [0.004]	0.009 [0.009]	.305
Length of time since last routine checkup	47508	−0.027 [0.003]	−0.065 [0.007]	.000

with health literacy across the four years. The uncertainty in knowing their distribution was reduced by 2.4%, 2%, 6%, 3.5%, 2.3% respectively in this model. Employment was a statistically significant association with health literacy. However, there was no change in uncertainty of its distribution. Health care coverage, length of time since last routine

checkup, were statistically significant associated variables across these years, yet the distribution increased by 6.5%, 6.4%, 6.3%, 4.9%, and 3.1%, respectively.

A logistic regression was performed to further investigated if demographic variable changes explain the trend in health literacy (Table 4). The analysis examined the trend while controlling for these variables. Individuals in 2012 were 45% less likely to have high health literacy compared to individuals in 2014 that were 39% less likely than the reference group in 2018. The comparison to individuals from 2016 was not significant. Those making less than $50 000 per year were less likely to have high health literacy when compared to those making more than $50 000 per year. Lower income individuals, those less than $15 000 where 49% were less likely to have high health literacy. Students were 91% more likely to have a high health literacy compared to those that are unable to work. Interestingly, for those employed full time, not employed, students or retired there were no significant findings. Although those who identified as a homemaker were 53% more likely to have high health literacy than those that were unable to work. There was also no statistically significant difference between married and unmarried individuals or by MSA residence. With age, those 35 to 44 years old were 43% more likely to have a higher health literacy than those 65 years or older. Those 18 to 24 years of age were less likely to have a higher health literacy. Those that had a higher educational status were more likely to have a higher health literacy. In comparison to Hispanics, there were no statistically significant differences. Individuals that considered themselves to have good or better health were 60% more likely to have a higher health literacy level than those that were considered to have fair or poor health.

Discussion

Data from the Kansas Behavioral Risk Factor Surveillance System (KS BRFSS) shows that although the proportion of individuals with less than high health literacy decreased from 2012 to 2018, there is still a large proportion of the population (51%) with a limited understanding of health information and the medical system. Additionally, those most at-risk for limited health literacy include those with an annual income of less than $50 000. Those who were likely to have high health literacy were those who were employed, in a relationship (partnered), or lived outside of a metropolitan area, were 65 and older, graduated from college or technical school, identified their race as Non-Hispanic, had health insurance, and good health conditions.[9] Health literacy was lowest among the age group 18 to 24-year-olds, those who identified as multi-racial, separated, not graduated from high school, out of work for more than 1 year, income less than $10 000, with other living arrangements, and living in a suburban county of a metropolitan statistical area.

Table 4. Adjusted Association Between Year, Demographic Variables, Healthcare Coverage, and General Health Rating to High Health Literacy.

Variable	High health literacy OR [95% CI]
Year	
2012	0.55 [0.47, 0.64]
2014	0.61 [0.52, 0.72]
2016	0.97 [0.81, 1.15]
2018	REF
Income	
<$15 000	0.51 [0.37, 0.71]
$15 000-<$25 000	0.63 [0.50, 0.78]
$25 000-<$35 000	0.75 [0.62, 0.90]
$35 000-<$50 000	0.72 [0.62, 0.84]
$50 000+	REF
Employment	
Employed full time	1.23 [0.92, 1.66]
Not employed	1.21 [0.81, 1.81]
Homemaker	1.53 [1.08, 2.17]
Student	1.91 [0.92, 3.95]
Retired	1.26 [0.93, 1.70]
Unable to work	REF
Marital status	
Not partnered	0.94 [0.82, 1.08]
Partnered	REF
Metropolitan Statistical Area (MSA)	
In MSA City Center	1.13 [1.00, 1.28]
Within MSA county but not City Center	1.05 [0.91, 1.21]
Outside MSA county	REF
Age (years)	
18-24	0.43 [0.24, 0.77]
25-34	1.19 [0.89, 1.58]
35-44	1.43 [1.16, 1.78]
45-54	1.24 [1.03, 1.48]
55-64	1.12 [0.97, 1.30]
65 or older	REF
Education	
Did not graduate high school	0.28 [0.19, 0.42]
High school graduate	0.47 [0.41, 0.54]
Some college or technical school	0.69 [0.61, 0.78]
Graduated college or technical school	REF
Race/ethnicity	
N-H White	0.87 [0.59, 1.29]
N-H Black	0.97 [0.60, 1.55]
N-H Other	1.06 [0.57, 1.96]
N-H Multiracial	0.97 [0.46, 2.03]
Hispanic	REF
Have healthcare coverage	
Yes	0.97 [0.74, 1.27]
No	REF
General health rating	
Good or better health	1.60 [1.34, 1.90]
Fair or poor health	REF

Abbreviations: N-H, Non-Hispanic.

Although the number of those with health insurance coverage (89%-91%) and annual income increased (29%-34% earning over $75 000) during the study period (2012-2018), these findings further highlight the continued health disparities experienced by minority and rural populations. Continued education and primary prevention are necessary to improve limited health literacy and health outcomes for these specific populations across communities.[14] Translating these findings back to the local level can help inform public health and primary care practitioners to prioritize individuals who are at risk or may have limited health literacy.[15-17] This study also supports additional programs and expanded educational efforts to continue efforts to enhance education and ultimately improve primary care for the 51% of the population with less than high health literacy.

There is a large amount of evidence about health literacy and associated factors across the globe, however many studies are with small sample sizes in clinical settings.[7] This study is one of the first to examine health literacy at the population level over an extended period of time. Additional data to study health literacy and the sequence of events related to health disparities is critical knowledge needed to continue addressing disparities in health outcomes.[18]

Strengths

The longitudinal component of the multi-year KS BRFSS survey is a strength. Longitudinal data provide detection and changes in population characteristics at both group and individual levels. It also extends past a single data point to establish the sequence of events. This is important data that is needed to advance health disparities research.[19] The study also had additional strengths including a large sample size and the use of a validated survey tool.

Limitations

This study had several limitations. The BRFSS survey was completed every 2 years rather than annually, limiting the breadth of data. Additionally, there were limited questions on participant demographics which included only: income, employment, marital status, MSA, education, race and ethnicity, and health literacy questions. Most participants (87.1%) identified as White, and the remaining 12.9% were of other races or ethnicities. In 2021 in Kansas, the White or Non-Hispanic population was 74%, Hispanic 13%, Black or African American 6%, Asian 3%, American Indian and Alaska Native 1%, and 2 or more races 3%.[20] The demographic makeup of the survey was close to the state demographics, however, minorities were underrepresented.[9] Factors and co-morbidity issues related to low health literacy among non-White residents of Kansas may not be well represented in the study population. Future surveys should include a more diverse group of participants, including

respondents from rural areas.[21] Limited health literacy is an issue for many, including low-income, diverse individuals.[4] Future studies should include a representative sample to continue addressing the complexities surrounding limited health literacy.

Conclusion

The study demonstrates how health literacy continues to be an issue, and how education and primary prevention are necessary to improve limited health literacy and health outcomes. Those reporting limited health literacy decreased during the time period and many health conditions improved. Additionally, those reporting health insurance increased slightly. These results can help inform public health and primary care practitioners to prioritize individuals and initiate programs to continue efforts to enhance education and ultimately improve primary care. Getting programs to help individuals improve health literacy could result in better health outcomes.

These findings further confirm the continued health disparities experienced by minority and rural populations. The trend data reflect these disparities and the importance of continued efforts to support those most at-risk for adverse health outcomes. The national BFRSS survey can inform researchers, organizations, and clinicians to enhance the understanding of high-risk populations and their healthcare needs. The contribution to better healthcare services can improve healthcare outcomes and lessen healthcare disparities among high-risk populations.[22] Findings from both state-level and national BRFSS population surveys can help educate the public health and clinical health services workforce to provide better care and address health disparities for high-risk populations.

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